

Summary Information

Module Code	5518USST
Formal Module Title	Applied Mechanics 2
Owning School	Engineering
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 5
Grading Schema	40

Module Contacts**Module Leader**

Contact Name	Applies to all offerings	Offerings
Dante Matellini	Yes	N/A

Module Team Member

Contact Name	Applies to all offerings	Offerings
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Partner Module Team

Contact Name	Applies to all offerings	Offerings
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Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

Partner Teaching Institution

Institution Name
University of Shanghai For Science and Technology

Learning Methods

Learning Method Type	Hours
Lecture	22
Practical	6
Tutorial	22

Module Offering(s)

Offering Code	Location	Start Month	Duration
SEP-PAR	PAR	September	12 Weeks

Aims and Outcomes

Aims	To provide the means for solving many mechanical engineering problems by learning the principles of mechanics for rigid and deformable solid bodies.
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Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Determine stresses and strains in an elastic continuum.
MLO2	Assess modes of failure for components under bending and torsional loading.
MLO3	Analyse dynamic behaviour of systems with one-degree-of-freedom by applying the notions of stiffness, damping, natural frequency and rate decay.
MLO4	Determine equivalent models for rigid body systems, analyse and evaluate their dynamic behaviour by using notions of experimental dynamics.

Module Content

Outline Syllabus

1. Continuum Stress Analysis:

Elasticity of a continuum. 2D stress/strain transformations, Mohr's Circle (stress/strain). Use of strain gauges to determine strains in loaded components. Practical examples.

Thin and thick walled cylinders. Application of thin wall pressure vessel theory. Cylindrical and spherical vessels. Application of Lamé's equations.

2. Failure Modes:

Yield criteria. Application of Rankine, Tresca and Von-Mises theories to components under bending and torsional loading conditions. Application to brittle and ductile materials.

Elastic instability. Critical buckling loads. Use of Euler, Rankine-Gordon and Perry-Robertson methods.

Fatigue. S-N curves and endurance limit. Factors affecting the endurance limit and their application. Effects of non-zero mean stress.

3. Dynamics and Vibration 1:

Free vibration of one-degree-of-freedom systems, modelling, equation of motion, harmonic motion and spectral analysis.

4. Dynamics and Vibration 2:

Forced vibration of damped and undamped systems, time and frequency response, natural frequencies and modes, notions of experimental dynamics.

Module Overview

Additional Information

This module includes content which relates to the following UN Sustainable Development Goals.

SDG9 – This module considers how to build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation.

SDG10 – This module will consider how engineering designers can consider accessibility when developing new products.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Exam	Exam	70	2	MLO1, MLO2, MLO3, MLO4
Test	VLE Test	30	0	MLO1, MLO2, MLO3, MLO4